

germinate seed. The dead timber is so dry that fires in the woods are hard to control, and considerable damage is being done by them.—*Report of voluntary observer.*

Lead Hill, Boone Co., Ark., 30th: the weather is dry and crops in general are in need of rain.—*Report of voluntary observer.*

Tuscarora, Elko Co., Nev., 30th: the weather during the month has been exceedingly dry and windy. The grass on the range is beginning to show signs of drying up. The Owyhee River is dry, and there is no snow of any account on the mountains. A hard time on stock is feared.

Beowawe, Eureka Co., Nev., 30th: the Humboldt River is lower than it has ever been at this time of the year, and there is no snow on the mountains. Hundreds of acres of barley in this county are suffering from drought.—*Report of Nevada State Weather Service.*

#### SUN SPOTS.

Haverford College Observatory, Pa. (observed by Mr. H. V. Gummere):

Date, April, 1889.	Number of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculae.	Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.		
4, 9 a. m. ....	1	1	0	0	0	0	1	1	0	Definition good.
5, 11 a. m. ....	0	0	0	0	0	0	1	1	0	Definition poor.
8, 3 p. m. ....	0	0	0	0	0	0	1	1	0	Definition poor.
9, 11 a. m. ....	0	0	0	0	0	0	1	1	0	Definition good.
10, 11 a. m. ....	0	0	0	0	0	0	1	1	0	Definition good.
11, 11 a. m. ....	1	4	0	0	0	0	1	4	0	Definition poor.
13, 12 m. ....	0	0	0	0	0	0	0	0	0	Definition good. Clouds prevented observation of faculae.
15, 11 a. m. ....	0	0	0	0	0	0	0	0	0	Definition poor.
23, 12 m. ....	0	0	0	0	0	0	0	0	1	Definition poor.
24, 10 a. m. ....	0	0	0	0	0	0	0	0	2	Definition good.
30, 9 a. m. ....	0	0	0	0	0	0	0	0	0	Definition poor.

Mr. John W. James, Riley, McHenry Co., Ill.: one, 20,000 miles diameter, seen 1st; on sun's meridian 6th, 10th, much smaller, probably vanished before reaching west edge; none others seen. Mr. M. A. Veeder, Lyons, Wayne Co., N. Y.: 3d, a spot of considerable size was seen about two days removed from the sun's eastern limb. This spot continued until the 11th when it faded out as it was approaching the western limb. 11th, a group of small spots was seen near the eastern limb. This group was not discovered on the day preceding, nor was it seen on the 13th. 19th, a group of bright faculae appeared by rotation. 27th, an extensive group of faculae was seen near the eastern limb in the location of the spot that was seen as above described on the 3d. Mr. H. W. Govey, North Lewisburgh, Champaign Co., Ohio: sun spots were observed on the 2d, 3d, 5th, 7th, 8th, 10th.

#### VERIFICATIONS.

The percentages of the official forecasts of the Signal Service for April, 1889, were not completed in time to be published in this issue of the REVIEW.

Percentages of local verifications of weather and temperature signals as reported by directors of the various State Weather Services for April, 1889.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois .....	86.4	86.2	New York .....	84.0	88.0
Indiana .....	83.4	86.8	North Carolina .....	79.3	74.6
Kansas .....	92.3	92.3	Ohio .....	77.0	84.0
Michigan .....	81.0	81.5	Pennsylvania .....	82.0	86.0
Minnesota .....	77.0	78.0	South Carolina .....	84.5	88.5
Nebraska .....	86.6	86.5	Tennessee .....	84.0	91.9
New Jersey .....	77.7	90.0			

NOTE.—In the table of percentages of official indications verified for February, 1889, published in the REVIEW for March, 1889, the percentage of verifications for Washington Territory should be 74.6.

#### STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts are republished from reports for April, 1889, of the directors of the various state weather services:

##### ALABAMA.

The average temperature for the month was 2.7 above the normal. The cold days were the 6th and 7th, and the maximum temperature occurred on the 11th and 12th. The cold days were accompanied by northwest winds that were so dry and blighting that tender plants in the gardens and fields suffered considerably. In some sections the cotton was so much damaged it was deemed best to replant.

The rainfall was 1.98 below the average, and the soil has become quite dry. Farmers complain very much about the dry condition of the atmosphere and the withering of the crops on account of the lack of rain.

##### SUMMARY.

*Temperature.*—Monthly mean, 63.2; highest monthly mean, 68.7, at Tuscaloosa; lowest monthly mean, 57.5, at Butler and Florence; maximum, 91, at Citronelle, 23d; minimum, 32, at Valley Head, 7th; range for state, 59; greatest local monthly range, 53, at Wiggins; least local monthly range, 33, at Columbiana and Troy.

*Precipitation.*—Average for the state, 3.62; greatest, 6.62, at Greensborough; least, 1.40, at Elkmont.

*Wind.*—Prevailing directions, northwest and west.—*P. H. Mell, Signal Corps, Auburn, director.*

##### ARKANSAS.

##### SUMMARY.

*Temperature.*—Monthly mean, 64.4; highest monthly mean, 69.6, at Russellville; lowest monthly mean, 61.7, at Heber, Osceola, and Ozona; maximum, 90, at Jimtown, Ind. T., 5th, and at Lead Hill, 2d; minimum, 33, at Little Rock; range for state, 57; greatest local monthly range, 65, at Jimtown, Ind. T., and Texarkana; least local monthly range, 33, at Lonoke.

*Precipitation.*—Average for the state, 2.84; greatest, 6.54, at Alexander; least, 0.50, at Heber.—*Prof. John C. Branner, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.*

##### COLORADO.

##### SUMMARY.

*Temperature.*—Monthly mean, 45.2; highest monthly mean, 56.0, at Magnolia; lowest monthly mean, 20.4, at Dolly Varden Mine; maximum, 88.0, at Longmont, 22d; minimum, —15.0, at Hartsel, 19th; range for state, 103.0.

*Precipitation.*—Average for the state, 1.73; greatest, 4.61, at Paoli; least, 0.54, at Glenwood Springs.—*Prof. F. H. Loud, Colorado Springs, director; T. W. Sherwood, Sergeant, Signal Corps, assistant.*

##### ILLINOIS.

##### SUMMARY.

*Temperature.*—Monthly mean, 52.9; maximum, 86, at McLeansborough, 18th; minimum, 22, at Aledo, 4th, and at Pontiac, 6th; mean of maximum, 78.2; mean of minimum, 27.7.

*Precipitation.*—Average for the state, 1.96.

*Wind.*—prevailing directions, northwest and northeast.—*John Craig, Sergeant, Signal Corps, Springfield, in charge.*

##### INDIANA.

The month of April, 1889, was exceedingly dry; small amounts of rain fell everywhere only on a few days. The deficiency of the amount for the state is nearly 2.00; the greatest deficiency occurred in the southern portion, and the least in the northern. The amounts measured during April, 1889, were the smallest in that month during the past ten years or more. The rains during the passage of the low areas of the 1st and 2d, 11th, 12th, 19th, and 24th, were accompanied by thunder-storms and hail; the hail which fell on the 12th was of large size, and fell in great quantities at many stations. Snow fell only in the northern portion on the 1st, 4th, 5th, and 6th, in small quantities.

The temperature was nearly normal; slightly above in the central, and slightly below in the northern and southern portions. The highest temperature was noted in the southern portion, 11th, in the central portion 19th, and on the 12th in the northern portion. The lowest was noted nearly everywhere, 6th. The range was uniformly 54 in all portions of the state. The

maximum did not reach a very high degree nor the minimum an exceedingly low reading. Warmer periods occurred from the 10th to 12th, 16th to 20th, and 23d to 24th; colder, 1st, 4th to 8th, 14th, 15th, and 26th.

## SUMMARY.

**Temperature.**—Monthly mean, 51.9; highest monthly mean, 58.8, at Ma-rengo; lowest monthly mean, 47.4, at Richmond; maximum, 86, at Vevay and New Providence, 11th, 12th; minimum, 20, at Mauzy and Delphi, 6th; range for state, 66; greatest local monthly range, 63, at Sunman and New Providence; least local monthly range, 44, at Rockville.

**Precipitation.**—Average for the state, 0.81; greatest, 2.08, at Mauzy; least, 0.50, at Marion.

**Wind.**—Prevailing directions, northeast and east.—*Prof. H. A. Huston, La Fayette, director; C. F. R. Wappenhans, Sergeant, Signal Corps, assistant.*

## IOWA.

April, 1889, was warm and fair, with normal amount of rainfall, southeasterly winds prevailing. The mean temperature was nearly 4 above the normal. During the three preceding years April has averaged as warm. The middle decade of the month was warmest, exceeding the normal by almost 7; the last decade, the coldest, yet it was 0.5 above the normal. The most noted warm spell occurred from the 17th to the 20th, and exceeded the normal by 11. The only cold spell of the month comprised the four days from the 27th to the 30th, and averaged but four below the normal; it served mainly as a beneficent check, the season having advanced too rapidly.

The rainfall of the month was nearly normal and mostly confined to the middle and warmest decade of the month, though extended rains fell as early as the 8th and as late as the 23d, and in the northeast and southwest on the 26th. The heaviest general rain fell on the 11th, over 1.00 fell throughout the east and south of Iowa; heavy rains fell also, locally, in the southeast, 18th. The total rainfall of the month was greatest, exceeding 4.00, in a belt from Lucas over Davis and Henry to Muscatine county; it exceeded 3.00 throughout the southwestern third of the state, and it was less than 2.00 in the northwestern third of Iowa.—*Dr. Gustavus Hinrichs, Iowa City, director.*

## KANSAS.

The mean temperature for the state, 55.3, is somewhat above the average, though it is 1.7 below the mean for April, 1888. There is an excess of temperature in all sections of the state; this excess is least in the extreme south-east counties, where it amounts to about 1, but increases from thence over the state, reaching 2 in Douglas and Leavenworth towards the north, 2 in Sumner, and 3.7 in Ford, to the west. The month opened with a warm wave, the maximum temperature for the month occurring on the 2d at nearly all stations. This hot wave was immediately followed by a cold wave on the 4th, when most of the minimum temperatures occurred over the state. But the "cold spell" of the month, and the one that has exerted the greatest influence towards retarding the growth of vegetation, occurred during the last days.

The average rainfall for the state, 3.14, is 0.10 below that of April, 1888. A deficiency exists east of an irregular line running from the northeast corner of Crawford to the northwest corner of Marshall counties. This deficiency occurs again in Norton and Decatur, while over the rest of the state there is an excess, which is most pronounced in Stafford, Barton, and southeast part of Russell. The greatest precipitation occurred in Labette, Montgomery, Cherokee, and Chautauqua, followed next by Stafford, Barton, and the southeast quarter of Russell. The observer at Quinter furnishes a record of 8.75, 6.50 of which is recorded on the 8th. This is considered so excessive that it is not entered in the tables nor used in the computations. Thunder-storms occurred on twelve days, and hail storms on ten days. Of the latter, the severest and most extensively distributed occurred on the 15th, 16th, and 17th and did much damage to roofs and window glass.

The weather conditions during the month have been very favorable to all crops, the excessive rains in the southeast being about the only drawback.

## SUMMARY.

**Temperature.**—Monthly mean, 55.3; highest monthly mean, 60.5, at Victoria; lowest monthly mean, 47.7, at Gibson; maximum, 96, at Brookville and Oakley, 2d and 25th; minimum, 23, at Washburn College, 4th; range for state, 73; greatest local monthly range, 69, at Darrance; least local monthly range, 42, at Cawker City; greatest daily range, 69, Darrance, 3d; least daily range, 2, at Hugoton, 7th, 10th, and 29th.

**Precipitation.**—Average for the state, 3.14; greatest, 6.68, at Independence; least, 1.50, at Colby.

**Wind.**—Prevailing direction, southeast.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.*

## KENTUCKY.

## SUMMARY.

**Temperature.**—The average temperature for April, as deduced from the tri-daily observations, was 56.4; from the mean of the maximum and minimum temperatures, 57.0. These figures show an excess of about 2 above the normal for the month. The mean maximum temperature was 69, and the mean minimum 45.1. The highest temperature reported during the month was 89, at Owenton, 23d; and the lowest 24, Owenton and Lexington, 6th. The average range of temperature was 55.1; the greatest monthly range was 61, at Frankfort; and the least 43, at Millersburg.

**Precipitation.**—The mean precipitation of the state, for April, was 1.61, which is about one-half the normal amount. The greatest amount recorded

was 3.76, at Bernstadt, and the least, 0.65, at Louisville. It appears that the month of April has largely increased the rainfall deficiency of the state for this season. At Louisville 10.00 would be required to bring it to the normal. The month was characterized by a great excess of cloudless weather, and an unusually small number of rainy days. The average number of clear or fair days was 18, and of days of rainfall 6. No snow is reported except at Ash-land, where 1½ inches was recorded during the month.—*Dr. E. A. Grant, Louisville, director; Frank Burke, Sergeant, Signal Corps, assistant.*

## LOUISIANA.

The month can be classed as having been very favorable to the agricultural interests, particularly in the northern section. The temperature was about 1.5 above the normal in the northern section of the state, and slightly above in the southern section. The cool days occurred during the first half of the month, and the warm days were the 23d, 24th, 29th, and 30th. There is a greater daily range of temperature reported than is usual for April, averaging about 4 above the normal daily range, and the average good condition of the crops shows that the amount of sunshine received counteracted the effects of the cool nights to a marked degree. There was not a semblance of frost formation in any portion of the state during the month.

## SUMMARY.

**Temperature.**—Monthly mean, 69.1; highest monthly mean, 73.7, at Cameron; lowest monthly mean, 65.0, at Farmerville; maximum, 94, at Cameron, 30th; minimum, 40, at Maurepas, 3d and 9th, and at Plaquemine, 8th; range for state, 54; greatest local monthly range, 52, at Vidalia; least, 21, at Shell Beach; mean daily range, 22.4.

**Precipitation.**—An average of 4.20 fell in the northern section, and but 2.18 in the southern section, making the average fall for the state 2.80. The amount falling in the northern section was 2.00 below the April average for that section; in the southern section it was 3.00 below the average. This rain fell on an average of four days throughout the state: the 1st, 13-14th, and 30th, being the general rainy days. An average of 1.70 fell on the 13-14th, which was about 60 per cent. of the total monthly rainfall. Greatest local monthly rainfall, 6.91, at Shreveport; least, 0.06, at Jennings; greatest daily rainfall, 4.15, at Farmerville, on 13-14th.

**Wind.**—Prevailing direction, south.—*R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.*

## MICHIGAN.

The temperature has been normal and the rainfall has been deficient, especially in the south half of the state.

## SUMMARY.

**Temperature.**—The mean temperature for the month, 43.5, is 0.5 below the normal of fourteen years. The temperature was above the normal in the upper peninsula and northern sections, and below the normal in the central and southern sections. The mean daily temperature was above the normal on thirteen days and below on seventeen days. The highest mean daily temperature for the past fourteen Aprils, 67, occurred on the 27th, 1888, and the lowest, 20, on the 4th, 1881. The highest mean monthly temperature, 52.7, occurred in 1878, and the lowest, 40.6, in 1881. The highest mean temperature this month, 57, occurred on the 19th, when the temperature was 10 above the normal, and the lowest, 28, on the 5th, when the temperature was 9 below the normal. The maximum temperature, 82, occurred at Gladwin, 18th, and the lowest, 10, at Sault de Ste. Marie, 5th.

**Precipitation.**—The average precipitation for the month, 1.48, is 1.04 below the normal of fourteen years. The precipitation was above the normal in the upper peninsula, and below in the southern peninsula, the deficiency increasing towards the southern line of the state. The largest deficiency, 1.96, was reported at Adrian, and the deficiency of about 1.00 extends along the first tier of counties south and gradually decreases to the north. In the lower peninsula, extending along the west shore from Grand Traverse to the lower part of Oceana county, and extending east to the second tier of counties, the rainfall was nearly normal; in all other sections the rainfall was below the normal from 0.25 to 1.00. In the central and southern sections the heaviest rainfall was recorded on the 11th and 12th; in the upper peninsula on the 23d and 24th, and in the northern section on the 18th and 19th. Rain was recorded at the different stations on 18 days of the month, while the average number of days on which 0.01 or more of rain was recorded, was but 8.2. The largest amount of precipitation, 4.26, was recorded at Calumet, and the least, 0.10, at Standish, Arenac Co.

**Wind.**—Prevailing direction, northwest.—*N. B. Conger, Sergeant, Signal Corps, Lansing, director.*

## MINNESOTA.

## SUMMARY.

**Temperature.**—Monthly mean, 45.6; highest monthly mean, 49.3, at Man-kato; lowest monthly mean, 39.2, at Pokegama Falls; maximum, 84.0, at Medford, 20th; minimum, 9.0, at Saint Vincent, 3d; range for state, 75; greatest local monthly range, 74, at Saint Vincent; least local monthly range, 45, at Brainard; greatest daily range, 50, at Moorhead, 25th; least daily range, 2, at Pokegama Falls, 2d.

**Precipitation.**—Average for the state, 1.67; greatest, 3.35, at Duluth; least, 0.69, at Saint Vincent. The monthly rainfall at Duluth is 52 per cent. in excess of the average at that point. If we except that portion of the state bordering on Lake Superior the precipitation was deficient about 40 per cent. Snow occurred in the northeastern counties on the 1st, 2d, and 3d of the month.

*Wind.*—Prevailing direction, northwest. — *Prof. W. W. Payne, Northfield, director; John Healy, Private, Signal Corps, Saint Paul, assistant.*

## MISSISSIPPI.

## SUMMARY.

*Temperature.*—The temperature during April was characterized by no large variations, but by continual slight fluctuations, the extreme daily mean temperatures being 74 and 54. There were four distinct rises of mean temperature, culminating about the 3d, 6th, 12th, and 23d, and intervening minima about the 1st, 4th, 7th, 16th. The mean temperature throughout the state varied above and below 60 during the first fifteen days, and afterwards remained continuously above 60. Although cool enough several nights during the first third of the month, no frost occurred. The mean temperature of the entire state for the month was 65.5, the normal being 64.7. The daily range of temperature varied very largely with changes in time and place. The least range reported was, 6, at Loch Leven, on the 14th; the greatest, 35, at University on the 2d. The extreme range of temperature in the state was from 92 at Louisville, on the 23d, to 34 at Booneville, on the 7th. The comparatively uniform temperature of the month was favorable to vegetation, whose development was from ten to twenty days earlier than usual.

*Precipitation.*—April was remarkable for its very scant rainfall. The normal amount is, for this state, 6.43, but the average for this April was only 2.90, making a general deficiency of 3.53 for the month, and of 8.86 since the first of the year. Only the central parts, from Vicksburg northeast to Starkeville, received as much as half the normal rainfall. The deficiency was greatest in the extreme northern and southern parts. At Mobile the amount was the smallest for any April in nineteen years. General and moderate rains fell about the 1st, 15th, 24th, and 30th, and were sufficient for most purposes. Rainfall amounting to 2 or more, in twenty-four hours, occurred at Canton, Macon, and Agricultural College on the 30th.—*R. B. Fulton, Signal Corps, University, director.*

## MISSOURI.

## SUMMARY.

*Temperature.*—Monthly mean for the state, 55.9; the highest reported in the state, 90, at Protem; lowest, 26.8, at Fayette; the average of maximum temperatures was 84.3, and the average of minimum temperatures, 32.1, making an average range of 52.2; the highest temperature occurred on the 2d, 11th, and 23d, and the lowest on the 1st, 4th, and 6th.

*Precipitation.*—The average for the state, 2.44, was 0.72 below the April normal. The greatest amount of precipitation reported was 5.40, at Kidder, and the least, 0.67, at Glasgow. In the state, as a whole, precipitation occurred on twenty-six days. The greatest number of days of precipitation at any one place was fourteen at Oregon.—*Prof. Francis E. Nipher, Saint Louis, director; G. A. Weber, Sergeant, Signal Corps, assistant.*

## NEBRASKA.

The month has been a propitious one, as regards weather, the precipitation being about normal for most of the state, with an abundance of rain in the northern part, while the temperature has been above the normal, with an almost entire absence of freezing weather.

## SUMMARY.

*Temperature.*—The comparison of past Aprils shows only one with a higher mean. There has been but one day below the freezing point in most parts of the state, and the present prospects for fruits and tender vegetation are good in nearly all parts of the state.

*Precipitation.*—The middle region of the Niobrara district was the centre of greatest precipitation, reaching about 6.00 at Kennedy. The least precipitation was at Ansley, in the centre of the state, amounting to only 0.50. The mean for southern Nebraska was a trifle less than the normal, but the number of rainy and cloudy days was above the normal.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Corporal, Signal Corps, assistant.*

## NEVADA.

The past month will long be remembered as an exceedingly dry and generally windy one.

## SUMMARY.

*Temperature.*—The average for the state, 53.5, as computed from twenty-four reports, was about normal; the days were generally clear to fair. El Dorado Canyon reported the highest, 100.2, 26th, and Eureka reported the lowest, 15.5, 18th, making a total range for the state of 84.7. The highest temperatures nearly all occurred during the warm period of the 24th to 27th, while the lowest temperatures occurred from the 14th to 18th.

*Precipitation.*—The rainfall was greatly deficient at all stations except Burner's Ranch in the southeastern portion of Elko county and at Pioche, Lincoln Co. The average for the state, 0.46, is less than the normal. At the majority of stations observers reported crops of all descriptions suffering greatly from the persistent drought. Very few stations reported any snowfall during the month, and when it is considered how little snow yet remains in the mountains the prospects are discouraging to agriculturalists and millmen.—*Prof. Chas. W. Friend, Carson City, director; H. F. Alciatore, Private, Signal Corps, assistant.*

## NEW ENGLAND METEOROLOGICAL SOCIETY.

## SUMMARY.

*Temperature.*—Monthly mean, 46.7 (101 stations); highest monthly mean,

50.7, at Holyoke; lowest monthly mean, 41.4, at West Jonesport and West Milan; maximum, 92, at North Woodstock, 19th; minimum, 12, at West Milan, 7th; range for New England, 80; greatest local monthly range, 70, at North Chesterfield; least local monthly range, 26, at Block Island; greatest daily range, 47, at Stratford, 16th; least daily range, 1, at Woonsocket, 18th. The average temperature for April for twenty-five stations, having records for more than ten years, is 43.5; average for April, 1889, 47.0, departure +3.5.

*Precipitation.*—Average for New England, 3.17 (121 stations); greatest, 6.66, at Plymouth, Mass.; least, 0.72, at Williamstown. The average precipitation for April for 31 stations, having records for more than ten years, is 3.30; the average for April, 1889, is 3.16; departure, -0.14.

*Wind.*—Prevailing direction, northeast (23 stations).—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; J. W. Smith, Sergeant, Signal Corps, assistant.*

## NEW JERSEY.

## SUMMARY.

*Temperature.*—The mean temperature, 51.2, is 3.3 above the average for the month, and also for the corresponding month of 1888. Highest monthly mean, 55.2, at Bridgeton; lowest monthly mean, 48, at Atlantic City; maximum, 83, at Tenafly, 21st; minimum, 25, at Allaire and Tenafly, 6th and 23d; range for state, 58; greatest local monthly range, 58, at Tenafly; least local monthly range, 37, at Ocean City; greatest daily range, 48, at Beverly, 11th; least daily range, 1, at Bridgeton and Trenton, 25th and 26th, respectively.

*Precipitation.*—The average precipitation for the state, 5.32, is 1.86 above the average for the month, and is 2.04 above the average for the corresponding month of 1888. Three stations, Hanover, Plainfield, and South Orange, report a total for the month exceeding 7.00; five stations, Freehold, Madison, Newark, Tenafly, and Union, a total exceeding 6.00; and nine stations, Gillette, Highland Park, Hopewell, Locktown, New York City, Ocean City, Oceanic, Somerville, and Trenton, a total exceeding 5.00.

*Wind.*—Prevailing direction, northeast.—*Prof. George H. Cook, New Brunswick, director; E. W. McGinn, Sergeant, Signal Corps, assistant.*

## NEW YORK.

## SUMMARY.

*Temperature.*—Maximum, 88, at Pendleton Centre, 19th; minimum, 14, at Saranac Lake, 6th; mean for the state, 45.3; the 19th being the hottest, and the 1st the coldest day; the temperature was above the normal at all stations, except Utica, where it was 3.3 below.

*Precipitation.*—Average for the state, 3.36. The precipitation was above the average at all stations, except at Albany, where it was 1.33, Buffalo, 1.04, Palermo, 0.14, Setauket, 0.13, and Utica, 0.73, below the normal. The greatest daily rainfall, 3.27, occurred at Ardenia, 29th. Average number of days on which rain or snow fell, nine.

*Wind.*—Prevailing direction, west.—*Prof. E. A. Fuertes, Ithaca, director; I. W. Brewer, Private, Signal Corps, assistant.*

## NORTH CAROLINA.

## SUMMARY.

*Temperature.*—Monthly mean, 55.9; highest monthly mean, 62.8, at Fayetteville; lowest monthly mean, 59.3, at Norfolk, Va.; maximum, 90, at Chapel Hill, 12th; minimum, 28, at Asheville, 7th; mean daily range, 20.4; greatest daily range, 24.5, at Mount Pleasant; least daily range, 10.5, at Hatteras.

*Precipitation.*—Average monthly rainfall, 4.03; greatest monthly, 11.87, at Norfolk, Va.; least monthly, 1.45, at Asheville.

*Wind.*—Prevailing direction, southwest.—*Dr. Herbert B. Battle, Raleigh, director; H. McP. Baldwin, Private, Signal Corps, assistant.*

## OHIO.

## SUMMARY.

*Temperature.*—The mean of the northern section was 46.8; of the middle section, 50.3; of the southern section, 52.9, and of the state, 49.9. These means are 0.1, 0.6, and 0.4 above the seven-year averages for the sections and state. The highest temperature, 88, occurred at Portsmouth, 12th, and at North Lewisburgh, 19th; lowest temperature, 15, at Bangorville, 6th. The mean daily range of temperature was 21.9. The greatest daily range being 48 at North Lewisburgh and Logan, 23d; the smallest, 3, at Jefferson, 27th.

*Precipitation.*—The month was remarkable for having the smallest rainfall on record in the bureau for the month of April. Precipitation was general in all sections on the 1st, 12th, 20th, and 24th; in the northern section on the 28th, and in the southern section on the 13th. Local rains were reported from all sections on the 2d, 5th, 6th, and 27th; from the northern and middle sections on the 3d, 11th, and 18th; from the northern section on the 4th and 19th, and from the southern section on the 30th. The mean rainfall in the northern section was 2.16; in the middle section, 1.64, and in the southern section, 1.57. The mean for the whole state was 1.79. These means are 0.03, 0.95, 1.66, and 0.88 below the seven-year averages for sections and state. The deficiency in rainfall for the year, to May 1st, amounts to 1.78 in the northern section; 4.38 in the middle section, and 6.26 in the southern section. The average deficiency for the state is 4.04. The greatest monthly rainfall was 3.16 at Ellsworth, and the least, 0.49, at Oberlin.

*Wind.*—Prevailing direction, north.—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.*

## PENNSYLVANIA.

## SUMMARY.

**Temperature.**—The average temperature of the state, 48.7, is 2.2 above that of April, 1888. Determined from the mean of the daily maximum and minimum temperatures, it was 49.7. The warmest period of the month was during the 19th and 20th, when the following temperatures were noted: Carlisle, 88; Hollidaysburg, Emporium, Grampian Hills, Uniontown, and New Castle, 84. The lowest temperatures were Charlesville and Somerset, 14, and Uniontown, 17, 7th. Stations reporting the highest monthly means for the state during April were Selin's Grove, 52.8; Swarthmore and Bethlehem, 52.4; Carlisle, 52.3. The lowest were Eagle's Mere, 42.3; Greenville, 44.1; Wellsborough, 44.2; Erie, 45.0; Somerset and Honesdale, 45.2.

**Precipitation.**—The precipitation averaged 4.50, with a decided irregularity in its distribution. The greatest totals were Wellsborough, 8.15; Girardville, 7.23, and Coatsville, 7.08. Most of the precipitation for the month occurred from the 24th to 29th, inclusive. Only a few stations report snow in measurable quantities; the following are notable exceptions: Charlesville, 5.20; Rimersburg, 9; Grampian Hills, 5; McConnellsburg, 12; Somerset, 12.50, and Columbus, 6, on the 6th.

**Wind.**—Prevailing direction, west.—Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant, in charge.

## SOUTH CAROLINA.

## SUMMARY.

**Temperature.**—The monthly mean, 62.4, is 0.7 below the normal of the last three years; highest monthly mean, 67.7, at Batesburg; lowest monthly mean, 58.5, at Clinton; maximum, 93, at Yorkville, 13th; minimum, 30, at Cedar Springs, 8th. In most instances the highest temperature throughout the state occurred on the 13th, and the lowest on the 7th. Monthly range, 63.

**Precipitation.**—The average for the state, 2.01, is 0.20 above the average of the past three years; greatest monthly, 4.10, at Aiken; least monthly, 0.37, at Batesburg; greatest daily, 1.35, at Evergreen, 14th. Average number of rainy days, 5.5.

**Wind.**—Prevailing directions, northeast and northwest.—Hon. A. P. Butler, Columbia, director; H. C. Seymour, Private, Signal Corps, assistant.

## TENNESSEE.

The principal meteorological features for April were the prevalence of high winds, the small amount of rainfall, and the small percentage of cloudiness. The month was generally very favorable for the advancement of the farm work of the season.

## SUMMARY.

**Temperature.**—The mean temperature, 59.9, was very slightly in excess of the average of the past seven years. The highest monthly mean, 66.7, was recorded at Woodstock, and the lowest, 56.1, at Greenville; maximum, 90, at Cog Hill, 12th; minimum, 23, at Springdale, 7th, and on the 8th at Lawrenceburg and Hohenwald. This was the highest April minimum recorded during the past seven years except that of last year, 30. The highest temperatures were generally recorded on the 11th, and the lowest on the 6th and 7th. The daily ranges of temperature were slightly in excess of the normal.

**Precipitation.**—The average rainfall for the month, 2.46, is 1.32 less than the April average for the past seven years, and the least during that period. Of this amount the eastern division received an average of about 2.50; the middle division a little more than that, while the western division received only about 2.00. Nearly three-fourths of this amount fell on four days, 12th to 15th, inclusive. These rains, also those of the 1st, 20th, 24th, and 30th, were general rains, the others were very light and local in character. The rain of the 14th was the heaviest during the month. The greatest monthly rainfall was 4.90, at Riddleton, and the smallest, 1.11, at Milan. The greatest local daily rainfall was 2.35, at Florence Station, 14th, which station also showed the greatest daily fall in March.

**Wind.**—Prevailing direction, west.—J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.

## TEXAS.

## SUMMARY.

**Temperature.**—The mean over the state was uniformly about 3 above the normal for April, except immediately along the Gulf coast, where the normal prevailed, and in that portion north of the 32d parallel and east of the 97th meridian, where the mean was from 4 to 6 in excess of the normal. The highest reported was 94, at Pecos City, 15th, and the lowest, 35, at Fort Elliott, 4th and 10th. The mean for the month for the eastern and southern portions of the state was 69; for the central and western portions, 64, and for the northern or Panhandle portion, 59.

**Precipitation.**—There has been a marked deficiency in the amount of rainfall for the month over the central and southern portions of the state, where only about 50 per cent. of the normal precipitation for April has fallen. The normal amount fell over the extreme western and northeastern portions of the state, while in the eastern portion of the Panhandle the rainfall was from 2.00 to 4.00 in excess of the normal. No general rains fell during the month, and that which fell was very unevenly distributed.—S. O. Young, M. D., Galveston, director; I. M. Cline, Sergeant, Signal Corps, assistant.

## Meteorological record of Army post surgeons and voluntary observers, April, 1889.

Stations.	Temperature. (Fahrenheit.)				Precip'n.		Stations.	Temperature. (Fahrenheit.)				Precip'n.
	Max.	Min.	Mean.					Max.	Min.	Mean.		
<i>Alabama.</i>							<i>California—Cont'd.</i>					
Ashland t.	80	43	60.0	2.43			Berendo	94	50	66.6	0.71	
Auburn	82	43	62.5	3.73			Berkeley	75	44	56.7	0.73	
Bermuda t.	85	38	61.3	1.21			Bishop Creek	93	44	68.2	0.12	
Butler t.	85	42	67.0	3.93			Boca	78	39	48.2	0.10	
Citronella t.	91	43	68.2	4.16			Borden	96	48	63.7	0.77	
Columbiana t.	75	42	65.0	3.91			Boulder Creek	87	41	60.8	0.39	
Decatur t.	85	40	61.2	1.40			Brentwood	87	52	67.2	0.62	
Elkmount t.	79	41	57.5	1.49			Brighton	87	51	64.6	0.11	
Florence	85	34	62.0	2.90			Byron	84	56	66.7	0.49	
Gadsden t.	84	42	66.0	6.62			Cactus	104	54	78.3	0.00	
Greensborough t.	83	40	63.7	4.03			Caliente	91	45	66.7	0.60	
Livingston t.	83	40	66.8	2.47			Calistoga	87	45	60.1	1.23	
Mt. Vernon B'ks.	90	42	65.2	5.22			Castroville	71	42	57.9	1.00	
Mount Willing t.	89	31	65.2	1.70			Centerville	81	54	62.2	0.95	
Motest	88	39	65.2	4.57			Chico	86	48	64.2	0.97	
New Market t.	83	30	68.0	4.50			Cisco	68	28	44.3	1.65	
Talladega	82	36	63.0	4.50			Colegrove				0.26	
Troy t.	88	50	68.5	3.74			Coles	83	35	53.2	0.96	
Tuscaloosa	80	37	68.7	5.99			Colfax	79	38	54.8	3.00	
Tuscumbia	85	41	62.2	1.70			Colton	102	48	67.1	1.02	
Union Springs	85	42	64.0	4.27			Corning	83	45	63.4	0.55	
Uniontown	84	41	67.5	5.25			Crescent City				5.75	
Valley Head t.	81	32	57.9	2.85			Cuyama	92	42	59.6	0.14	
Wiggins	90	37	65.2	2.69			Davisville	89	52	64.5	1.17	
<i>Arizona.</i>							Delano	97	50	68.6	0.22	
Antelope Valley				0.00			Delta	88	38	59.1	2.91	
Benson	92	50	70.3	0.00			Downey	90	48	65.6	0.48	
Casa Grande	99	54	74.2	0.10			Dunnigan	80	51	64.5	1.49	
Cedar Springs t.				0.22			Dunsmuir	94	39	51.3	2.43	
Curtis				0.05			Edgewood	75	32	50.7	0.69	
Flagstaff		25		0.75			El Dorado	86	46	62.3	1.60	
Florence	99	44	69.6	0.13			Elmira	95	45	66.9	0.59	
Fort Apache	86	32	54.9	0.30			Emigrant Gap	72	27	46.4	2.29	
Fort Bowie	86	40	64.2	0.22			Esperanza	88	42	63.9	0.66	
Fort Huachuca	90	37	63.4	0.22			Evergreen				1.06	
Fort Lowell	100	36	66.2	0.30			Farmington	91	51	64.5	0.20	
Fort McDowell	103	39	68.1	?			Florence	90	51	64.3	0.02	
Fort Mojave	103	34	69.1	0.71			Folsom	88	53	66.3	0.39	
Fort Verde	94	34	60.6	?			Fort Bidwell	80	22	51.4	1.08	
Globe	94			0.43			Fort Gaston	85	21	53.6	2.90	
Holbrook	89	29	59.5	0.10			Fort Mason	72	46	57.9	0.67	
Maricopa	97	58	73.9	0.00			Fresno	94	50	69.1	0.77	
Mount Huachuca	88	42	60.3	0.14			Fruto	87	42	64.0	0.92	
New River	78	42	57.8	0.00			Georgetown	78 h	34	54.8	2.77	
Pantano	98	42	68.5	0.88			Gilroy	85	45	61.3 d	0.63	
Peoria	101	44	69.2	0.01			Girard	89	40	55.8	0.49	
Phoenix	100	47	70.0	0.14			Glen Ellen	85	45	58.9	1.27	
San Carlos				0.30			Goshen	92	50	68.7	0.28	
San Simon	102	40	63.7	?			Grass Valley				3.87	
Tombstone	86	45		0.00			Hanford d.	90	50	64.6	0.63	
Teviston				0.20			Hollister	85	52	64.0	0.81	
Texas Hill	106	63	80.0	0.00			Hornbrook	90	29	56.3	0.43	
Tucson (1)	95 j	43 g	69.0 m	0.18			Indio	105	54	74.2	0.00	
Tucson (2)	97	45	67.7	0.70			Ionc	90	45	62.8	0.25	
Volunteer Springs	82	22		0.00			Jolon				0.59	
Wilcox	95	41	67.8	?			Keeler	84	46	63.2	0.12	
Williams	76	21	47.8	0.05			Keene	84	35	55.9	0.95	
Winslow	86	21	53.6	0.02			Kingsburgh	94	52	68.2	0.47	
<i>Arkansas.</i>							King City	82	38	54.2	0.29	
Alexander	82	44	63.3	6.54			Knight's Landing	95	44	62.6	0.42	
Arkansas City t.				2.47			La Grange	94	41	62.9	0.58	
Canndn t.	85	45	66.1	5.39			Lathrop	87	40	60.3	0.33	
Conway	83	47	64.6	2.06			Lathrop	86	40	60.2	1.39	
Dallas t.	81	40	62.1	2.75			Lenmore	96	50	67.8	1.70	
Dardanelle				2.60			Livernore	85	47	59.0	0.51	
Dayton	82	48	64.1	7.12			Los Beach	86	49	66.2	?	
Forrest City	87	44	67.7	4.12			Los Angeles	91	50	63.5	0.25	
Fulton t.				3.81			Los Gatos	85	46	63.4	0.74	
Heber	85	40	61.7	0.50			Mammoth Tank	106	54	69.3	0.00	
Helena (1) t.				3.90			Martinez	76	44	59.6	0.60	
Helena (2)	85	42	65.7	3.90			Marysville	85	55	69.5	1.00	
Hot Springs	85	40	64.5	3.95			Menlo Park	81	46	59.1	0.69	
Lead Hill	90	36	63.1	1.57			Merced	92	46	63.3	0.20	
Little Rock B'ks.	86	38	64.0	4.48			Modesto	86	48	61.0	0.19	
Lonoke	81	45	66.6	2.62			Mojave	99	40	61.0	0.00	
Madison t.				0.41			Montague	84	41	62.0	0.55	
Newport (1) t.				4.11			Monterey	70	51	60.0	1.15	
Newport (2)	83	36	62.1	3.30			Monterey (Hotel del Monte)	70	52	60.6	1.92	
Osceola t.	84	38	61.7	1.48			Mount Hamilton	74	30	50.3	0.72	
Ozone t.	78	43	61.7	1.96			Newark	80	50	61.6	0.40	
Russellville	85	41	60.6	2.00			Newhall	93	38	61.1	0.25	
Stuttgart t.	82	44	63.4	4.07			Newman	90	40	62.4	0.82	
Texarkana	88	33	63.4	2.92			Niles	83	53	63.2	0.27	
Washington t.	85	42	66.1	2.69			Norwalk	95	55	67.1	0.93	
<i>British Columbia.</i>							Oakland (1)	74	48	59.0	0.71	
New Westminster	71	35	51.8	2.69			Oakland (2)	70	50	59.6	0.39	
McGill College, (Montreal)	74	24	43.3	2.15			Oranville	98	50	69.6	1.61	
<i>California.</i>							Orland	82	45	63.1	1.02	
Alcade	98	48	67.4	1.40			Pajaro	90	52	70.0	0.87	
Alcatraz Island	70	49	57.2	0.53			Paso Robles	84	41	60.2	0.45	
Almaden	85	48	62.7	0.79			Petaluma	85	43	68.6	1.34	
Anaheim	94	54	65.5	0.24			Placerville	81	47	59.4	1.99	
Anderson t.	88	44	62.2	4.09			Pomona	83	42	58.8	0.57	
Angel Island	77	40	59.8	1.08			Presidio of San F.	70	43	56.2	0.45	
Antioch	87	43	60.4	0.46			Puente	93	52	63.0	0.95	
Aplos	75	45	59.7	0.85			Red Bluff	86	48	62.2	2.33	
Athlone	95	47	67.1	0.77			Redding	88	43	63.5	1.09	
Auburn	83	43	59.3	1.36			Riverside	98	43	62.3	0.64	
Bakersfield	95	54	70.0	0.15			Rocklin	88	44	62.8	1.40	
Barstow	94	44	65.6	0.00			Rumsey	85	34	62.8	0.30	
Benicia Barracks	77	42	59.0	0.88			Sacramento (1)	82	36	58.6	0.30	